



Co-Operation for Restoring  
Cockle Shellfisheries  
and its Ecosystem Services  
in the Atlantic Area (AA)

03

## IN THIS ISSUE



### Second year on the “road” for COCKLES project

*During this second year, interesting research results within all the work packages (some of them already published in scientific international journals) and dissemination and capitalization activities have been carried out by COCKLES' partners towards the accomplishment of the project objectives.*

*In this third newsletter, the development of a molecular tool for the identification of the common edible cockle ('Cerastoderma edule') and its related species, the lagoon cockle ('C. glaucum'), is described. Both species are hardly differentiated by morphological characters, especially during the younger stages, being this tool very useful for industry because only 'C. edule' is highly appreciated for food. New insights on parasites affecting cockles are presented with information from the different Atlantic Area regions targeted. Moreover, this newsletter introduces the activity and the importance of cockles for the Cambados Fishers' Association (one of the project's associated partners) and it also presents the project team members of University of Aveiro and CETMAR. Finally, all the dissemination and outreach activities, including workshops and meetings carried out by the COCKLES partners during 2018-2019 are also highlighted. COCKLES partnership wishes that all the information provided will be attractive and useful for any audience interested in this highly valuable natural resource. Enjoy the reading!*

### COCKLES in a cockleshell

#### Programme

Interreg Atlantic Area

#### Execution Dates

2017.10.01 – 2020.09.30

#### Project Coordinator

Rosa Fernández, Spain

#### Proponent Institution

Centro Tecnológico del Mar,  
Fundación CETMAR · ES

#### Countries

ES, PT, FR, IE, UK

#### Funding Entity

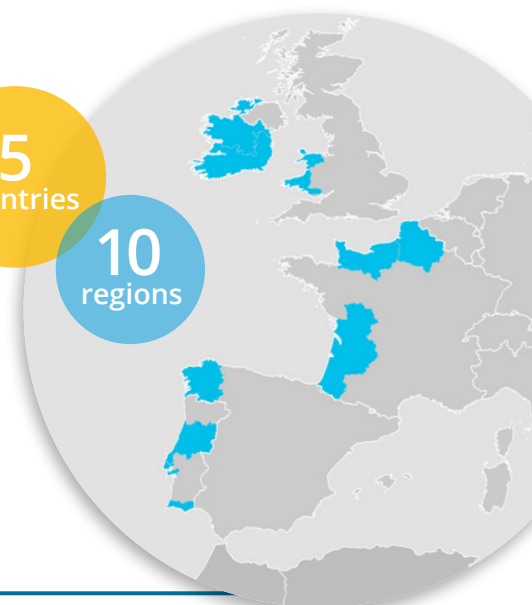
European Union

#### Total Funding

3,613,017.54 €

5  
countries

10  
regions



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Biodiversity,  
Natural and  
Cultural Assets

## What is the difference between *Cerastoderma edule*, the common edible cockle, and *C. glaucum*?

USC · ES

The edible cockle (*Cerastoderma edule*) and lagoon cockle (*C. glaucum*) are two cockle species which are not easily distinguishable at glance, especially in younger stages. There are some morphological characteristics such as shell outline, width/length relation, ligament length, radial ribs and growth rings used for their discrimination. Thus, adult *C. glaucum* individuals are wider, with a shorter ligament and more marked ribs and growth rings while the shell outline of *C. edule* is rounder (Fig.1). Interestingly, both species show different resistance to the parasite *Marteilia cochillia*, responsible for marteiliosis outbreaks. *C. edule* is severely affected by the parasite which has led to the reduction of the species production. However, *C. glaucum* seems to be resistant. The reasons of this differential resistance are still unknown making hybrids between species especially interesting, because they could be a way to introgress allelic variants responsible for tolerance either naturally or through

artificial selection in *C. edule*. Currently, there are molecular techniques for the discrimination of both species although they show important limitations for the identification of hybrids because they are based on genetic markers difficult to interpret in terms of hybridization. Taking advantage the genomic libraries developed in Work Package 4 (WP4) and the *C. edule* genome (which will be released soon), the University of Santiago de Compostela (USC), with the collaboration of Centro de Investigaci3n Mariñas (CIMA), has developed a cheap and straightforward molecular tool based on seven diagnostic nuclear genetic markers (Single Nucleotide Polymorphisms, SNPs) for species identification (each species has a different

fixed allelic variant for each marker). This tool enables the identification of putative hybrids beyond the first hybrid generation (F1), to say, F2, backcrosses, depending on the different genotyping composition combinations (i.e. multilocus genotype) regarding the pure species. Seventeen natural beds distributed across the natural distribution of both species (including beds where hybrids by other molecular tool had been suggested) were analysed, but natural hybridization was not detected. However, we cannot rule out that hybrids occur in natural beds and, especially be produced in captivity, and for that this SNP-based molecular tool represents an efficient way.



Fig 1. Adult individuals of *C. edule* (left) and *C. glaucum* (right).

\*The information reported refers to WP4

## New insights on trematodes in the Ria de Aveiro\*

UA · PT

Trematodes are prevalent macroparasites in coastal waters that use cockles as first and/ or second intermediate host. These parasites are able to modulate COCKLES population dynamics, however the patterns by which they govern are still poorly understood. Regarding this, sampling surveys were performed recently to assess the effect of cockles vertical position (intertidal vs. subtidal) on trematode infection levels comparing upstream and downstream areas of the Ria de Aveiro (Portugal). Additionally, laboratorial experiments were performed in pre-designed mini flumes to

determine the influence of water flow on cockles infection success by trematodes. To this end, cockles were collected in four intertidal and the nearest subtidal bed where cockle density, trematode infection and sediment and water physico-chemical features were assessed. Besides, simulations with numerical model Mohid were performed to characterize the hydrodynamics of the lagoon.

Results demonstrated higher individual infection on intertidal cockles than those from subtidal beds, highlighting that host vertical position represents an important driver of trematode infection. Moreover, the individual infection was significantly different comparing cockles from the two sampled areas (downstream and up-

stream), suggesting an important influence of other environmental drivers, such as hydrodynamics. Convergenly, higher hydrodynamics demonstrated experimentally to increase trematode infection success. This study provided valuable information on trematode/cockle system dynamics and the influence of cockles habitat and the involved abiotic factors on trematode infections that will be useful in natural cockles stock management.



Regarding sampling surveys in the Ria de Aveiro

\*The information reported refers to WP5



## First occurrence of *Marteilia*-like parasite in cockles from the Ria Formosa (Portugal)\*

IPMA · PT

Marteiliosis is a disease of molluscs caused by marine protozoan parasites, which is still poorly known, although responsible for cockles mortality outbreaks in Galicia. During routine examination of cockles from Ria Formosa, the occurrence of putative *Marteilia*-like parasite (Fig.3) was recorded by the IPMA team through cytological and histological analysis.

In order to classify genetically the agent, a generic PCR assay for genus *Marteilia* and a more specific PCR assay for *Marteilia cochillia* using DNA from Galician cockles infected with *Marteilia cochillia* as positive controls were done. The results were negative for all the Portuguese samples. Although the pathogen observed is not *M. cochillia*, nor associated with massive mortalities, the lesions observed in digestive gland of cockle caused by this agent are signifi-

cantly severe. So, we must be cautious and recommended further monitoring in this area to avoid spreading this type of pathogens.

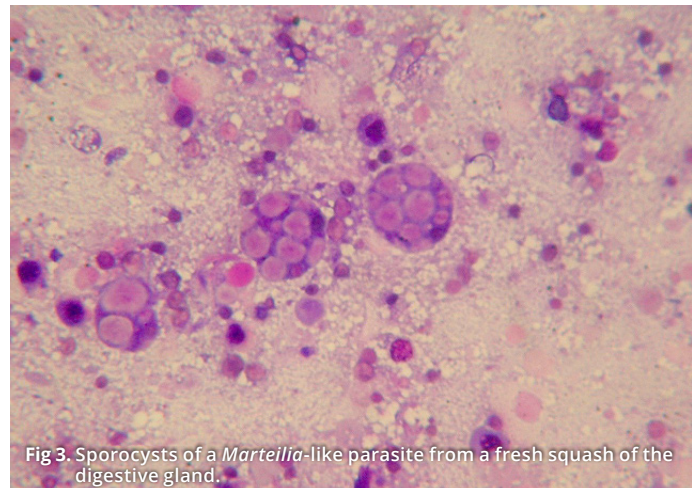


Fig 3. Sporocysts of a *Marteilia*-like parasite from a fresh squash of the digestive gland.

\*The information reported refers to WP5

## Cockles from Cambados

Confraría de Pescadores San Antonio de Cambados · ES

The San Antonio de Cambados Fishers Association is a non-profit organization which partners work in different fish-



*Cerastoderma edule*

eries and shellfish harvesting sectors. Within the association there are two groups of harvesters, one where shellfish is harvested on foot and another where the harvesting is carried out from vessels. In both groups, there are more than 380 people involved.

The on foot group of shellfish harvesters works on a nearly 2,000,000 m<sup>2</sup> natural bank (O Sarrido) where they extract and grow the Manila clam (*Ruditapes philippinarum*), native clams (*Ruditapes decussatus*) and cockles (*Cerastoderma edule*). The importance of cockles in Cambados, is mainly related to on foot shellfishing, which was represented by more than 95% of women until 2010, whose activity accounted for 10 to 20% of annual income, depending on the year. From that date until today the production of cockles in the association is almost testimonial. The presence of several pathological alterations present in cockles from 'O Sarrido' and mainly the emergence of the parasite *Marteilia cochillia* caused a massive bivalve mortality in this area. In this situation, this association volunteered to collaborate with several Research Centres and Universities, aiming to improve the awareness on pathologies affecting cockles and thus being able to improve its fishery management. Thus, since 2012, the Technical Assistance from the Cambados association has been participating in regional, national and international research projects, as collaborator and researcher.

The presence of Cambados association in the COCKLES project is fundamental to continue the advance in the knowledge on ecology and problems affecting cockles as an important shellfish resource in our region. The maritime sector, through its organizations (associations, producers, cooperatives...) must, and usually are willing to, be present in the different research projects aimed at solving problems and facing future challenges in the fishing and shellfish harvesting activities.

## 'Meet our Team'



### CETMAR Team | Spain



From left to right: Silvia Torres, Mónica Incera, Elena Couñago and Rosa Fernández.

#### Rosa Fernández Otero

**Position** Head of Technology Promotion and Transfer Department in CETMAR.

**Place of birth** O Grove, Spain.

**Education** MSC in Economy by the University of Santiago de Compostela (1995) and a Postgraduate Diploma in Business Management and Administration (Caixanova Business School, 1996).

**Hobbies** So many but music and literature first. I am also passionate about the coastal landscapes, including cockles' sites :-)

#### Silvia Torres López

**Position** Head of the Marine Technology Unit in CETMAR.

**Place of birth** Madrid, Spain.

**Education** MSC in Marine Science (University of Cádiz, 1996), PhD in Marine Science, University of Vigo, 2003.

**Hobbies** Astronomy, Trekking, reading, sailing.

#### Elena Couñago Sánchez

**Position** COCKLES project technician (Marine Technology Unit).

**Place of birth** San Sebastián, Spain.

**Education** MSC in Marine Science (University of Vigo 2003), Master Geoinformatics (University of Vigo 2015).

**Hobbies** Hiking, traveling, discovering culture trough food, including cockle's recipes!

#### Mónica Incera Filgueira

**Position** COCKLES project technician (Technology Promotion and Transfer Area).

**Place of birth** Vigo, Spain.

**Education** MSC in Marine Science (University of Vigo, 1996); PhD in Marine Science, University of Vigo, 2004.

**Hobbies** I love swimming, running, enjoying my family and recover energy with my homemade cockles "empanadas" (delicious Galician pies).

CETMAR is a Public Foundation setup in 2001 by the Regional Government of Galicia (Xunta de Galicia) together with the former Spanish Ministry of Science and Technology, currently the Spanish Ministry of Science, Innovation and Universities. CETMAR aims to improve the conditions for a more sustainable use of the marine environment and resources and in this framework, to increase the sustainability of marine related human activities for a more sustainable growth, better jobs and wellbeing.

Two of the CETMAR departments are involved in COCKLES. The Technology Promotion and Transfer Area coordinates and manages the project and works to guarantee that the outputs and outcomes of the project reach their beneficiaries and users. Another relevant contribution is to identify and assess how cockles benefit human beings, particularly though the mapping of the cultural ecosystem services they provide, unveiling the rich cultural legacy from this species. The Marine Technology Unit contributes to the validation of the cockle larvae particle tracking model in Galicia and gets in charge of its insertion in a user-friendly operational management GIS tool which will also be used to show COCKLES' project results from an integrated perspective, embedding relevant data obtained throughout the different project activities.





## UA Team | Portugal



From left to right: Rosa Freitas, Simão Correia and Luísa Magalhães.

### Rosa de Fátima Lopes de Freitas

**Position** Auxiliar Researcher at Biology Department, University of Aveiro.

**Place of birth** Santo Tirso (Porto district), Portugal.

**Education** Biology degree (1997), PhD in Biology (2005).

**Hobbies** Normally all my free time is spent with family, playing outside activities or watching movies.

### Luísa Virgínia de Sousa Magalhães

**Position** Postdoctoral Researcher at Biology Department & CESAM, University of Aveiro.

**Place of birth** Vila Nova de Gaia, Portugal.

**Education** MSc in Marine Biology (University of Aveiro, 2010) and PhD in Biology and Ecology of Global Change (University of Aveiro and University of Bordeaux, 2018).

**Hobbies** Spending quality time with family and friends. One of my favourite activities is to coloring and molding plasticine with my daughter Alice.

### Simão Pedro Domingues Correia

**Position** Master Student and Research Fellow at Biology Department & CESAM, University of Aveiro.

**Place of birth** Trofa, Portugal.

**Education** Biology Degree (University of Aveiro, 2017).

**Hobbies** Listen to music and spend time with family and friends. I also like to play drums and music along with my friends.

UA is a public foundation under private law whose mission is to contribute to and develop graduate and postgraduate education and training, research and cooperation with society. UA team belongs to CESAM-Centre for Environmental and Marine Studies. The mission of CESAM is to develop leading international research on environmental sciences and related risks, including extreme weather events and climate change, with emphasis on complex socio-ecological coastal systems and marine areas. The main objective of CESAM is to promote a more efficient use of terrestrial and aquatic (from catch-

ment to the deep sea) environmental resources and a more competitive, resilient and sustainable economy, designed to endorse job creation and assure territorial and social cohesion. Furthermore, CESAM aims to develop transdisciplinary research and international collaboration among researchers, innovators and students, and foster the scientific, societal and educational (graduate & postgraduate) impact of its research and innovation. CESAM has a multidisciplinary team that gathers researchers, students and collaborators with knowledge and competences in fundamental and applied research, actively contributing to science-based knowledge supporting the understanding and functioning of socio-ecological systems, in relation to local/regional and global changes. UA (CESAM) team is the leader of dissemination and communication actions, including development of dissemination material for end users (especially stakeholders); development of workshops; dissemination of scientific information and development of activities for general public to disseminate the project outputs. Besides, UA team has been participating in the identification of parasites in cockles and environmental characterization.





# COCKLES' Outreach Activities

## COCKLES activities for Galician schools

CETMAR · ES



CETMAR has carried out several activities around COCKLES project adapted to different education levels. The main threats of cockle beds in Galicia and the goals of COCKLES project have been explained to students from 6 up to 11 years old.

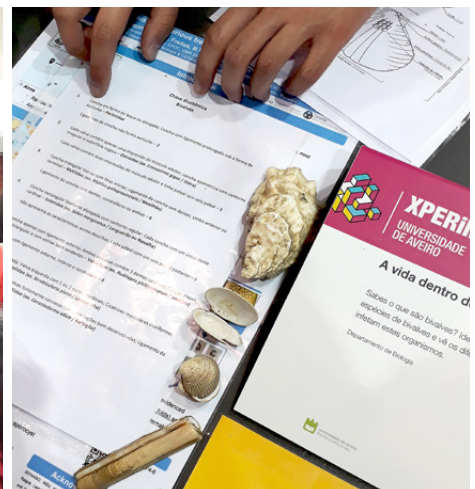
The youngest students (3 to 5 years old) had a lot of fun picking cockles from tricky sand trays and making colourful cockles butterflies. Besides this, COCKLES promotional materials (puzzles, bags and pens) have been distributed to more than 30 schools in the area of Vigo with a lot of success!



## The University of Aveiro has open doors!

UA · PT

This year UA hosted an event designed to provide a unique experience that allowed to combine scientific work with leisure moments. During the 29<sup>th</sup> and 30<sup>th</sup> of April, UA invited students, teachers and the general public to get to know the campus, the projects and the scientists that daily develop their activity in UA.





## COCKLES dissemination activities with Brownies

UCC · IE



A group of approx. 30 Brownies participated in a COCKLES dissemination activity in Ireland. Brownies are girls with ages between 7 and 10, part of the World Association of Girls Guides and Girls Scouts, who came to spend the weekend in Cuskinny. Cuskinny is one of the field sites for the COCKLES project. Here they learned about different species found at the site, including cockles and their predators. They each got to decorate a cockle to bring home and learned how to count the age rings.



## COCKLES at Ciência 2019

UA · PT



Ciência 2019 was the latest edition of the annual scientific meeting of Portuguese researchers. It aimed at promoting a broad debate on the main topics and challenges of the scientific agenda beyond the world of research. The meeting main goal was to stimulate not just the participation but also the interaction between researchers, the business sector and the general public. COCKLES project was represented in CESAM & University of Aveiro stand with dissemination material and a monitor where promotional videos of the project were showed.





## COCKLES' Workshops



### Technical Workshop on Cockles Diseases

Arcachon · France

Ifremer, CNRS and University of Bordeaux co-organized a workshop devoted to cockles' diseases, at the Marine Station of Arcachon (20-21<sup>st</sup> March 2019). Fifty-four participants from 21 European countries (European Reference Laboratories and COCKLES project colleagues) exchanged their expertise and participated to a practical exercise (fresh tissues and histology analyses).

### 'Together for Sustainable Aquaculture' in the European Maritime Day 2019

Lisbon · Portugal

**WORKSHOP IN AQUACULTURE**  
W08: Aquaculture and fish processing

## Together for Sustainable Aquaculture

Congress Center Lisboa, Praça das Indústrias 1, 1300-307 Lisboa, Portugal

May 16th | 14:15h - 15:45h  
FREE ENTRY | ONLINE REGISTRATION (MANDATORY)

**Organization:** ANP | WWF, CESAM-UA, MARE-ULisboa  
**Duration:** 1h30

**Moderator:**  
Ricardo Calado (CESAM-UA)

**Speakers:**  
Ana Pombo (MARE-IPLeiria)  
Fernando Gonçalves (Portuguese Association of Aquaculture)  
Pedro Encarnação (Jerónimo Martins Group)  
Catherine Pianté (WWF France)

This workshop will consist on a participated discussion among aquaculture stakeholders, based on the four major pillars that support a sustainable aquaculture: Science, Economy, Social and Environment aspects. Four speakers will handle some key initial issues on each of those pillars.

- Innovative scientific tools useful to improve aquaculture processes (Science).
- Technological and management solutions needed to improve the economic value of aquaculture (Economy).
- Social changes induced by the transition/integration between fisheries and aquaculture (Social).
- Prevention and mitigation of major environmental impacts associated to aquaculture activity (Environment).

The moderator will stimulate an open discussion among all participants, with the aim of identifying common problems and solutions among different stakeholders.

The FCUL team member Paula Chainho participated at the Workshop in Aquaculture: *Together for Sustainable Aquaculture* that took place at the European Maritime Day 2019, in the 16<sup>th</sup> May in Lisbon, Portugal. This workshop was co-organized by 'Associação Natureza Portugal' in association with World Wide Fund For Nature (ANP|WWF), 'Centro de Estudos do Ambiente e do

Mar – Universidade de Aveiro' (CESAM-UA) and 'Centro de Ciências do Mar e do Ambiente' (MARE-ULisboa). The major objective was to bring researchers, the aquaculture industry sector, public administration and NGOs together to discuss the future for sustainable aquaculture, based on a joint effort and shared knowledge between different stakeholders.



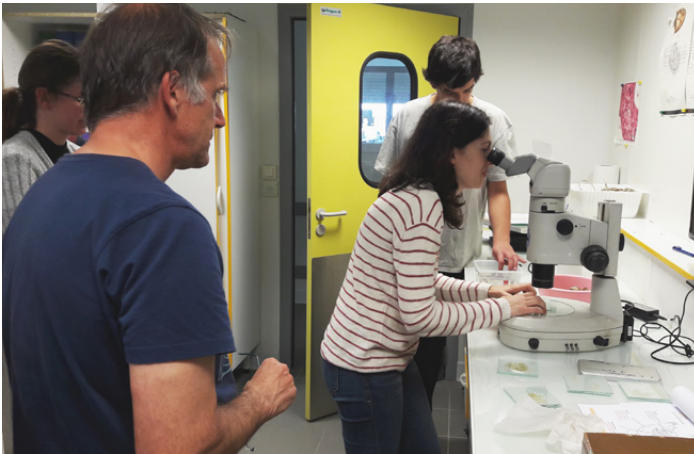
### COCKLES' Training in Histology

La Tremblade · France

A workshop on identification of main pathogens of cockles by histology took place in La Tremblade, in the IFREMER facilities, from 20<sup>th</sup> to 24<sup>th</sup> May. This event was organised by the EU Reference Laboratory for mollusc diseases, Ifremer La Tremblade (France).







Emily Groves testimony:  
*"The training course offered by IFREMER at la Tremblade was a fantastic opportunity to learn how to identify cockle parasites using histology. I now feel confident identifying parasites in our Welsh samples, and look forward to using everything I learned in La Tremblade. A very special thank you to Isabelle for organising everything and to Bruno for teaching us so many things!"*



## Workshop on Cockle Culture Procedures

UA · Portugal

UA, CETMAR, CIMA and IPMA members organized a workshop on Cockle Culture Procedures that took place in Portugal at the University of Aveiro (23<sup>rd</sup> September 2019). This workshop was attended by more than 30 people from different age groups and backgrounds: fisherman, producers, policy makers, students, entrepreneurs and researchers. The main issue discussed was the development and innovation of cockles and other bivalves culture procedures at the service of marine resources conservation. It was glaring the need for more actions that can promote interaction and organisation of the people in the primary sector.





# COCKLES' Meetings



## European Geosciences Union Meeting 2019 Vienna · Austria

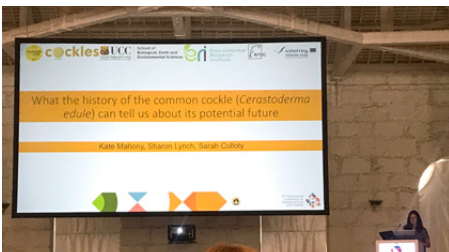
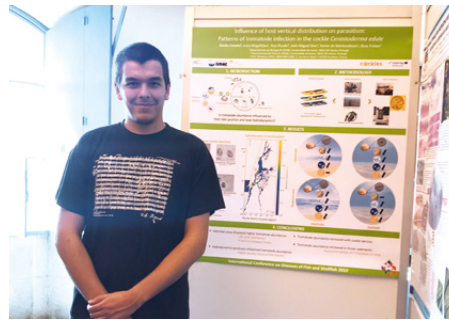
Sophie-Berénice Wilmes presented work from the COCKLES project at the European Geosciences Union meeting in Vienna in April 2019. Her presentation was entitled 'Interannual variability in larval dispersal in a shelf sea front region' and was presented in the session 'Open session on coastal and shelf seas'.



## International Conference on Diseases of Fish and Shellfish 2019 Porto · Portugal

Several COCKLES members participated at the 19<sup>th</sup> International Conference on Diseases of Fish and Shellfish organised by the European Association of Fish Pathologists (EAFP). The conference promoted

colleagues from all around the world, sharing knowledge of the most recent advances on Fish and other Aquatic Organism's Pathology. The scientific programme included distinguished key note speakers from countries across the world, as well as oral and poster presentations, including contributions from Antonio Villalba from CIMA, Isabelle Arzul from IFREMER, Kate Mahony from UCC and Simão Correia from UA. The conference was also attended by Francisco Ruano from IPMA, Paulino Martínez from USC, Sharon Lynch from UCC and Susana Darriba from INTECMAR, members of the COCKLES project team.







## SeaFest was moved to Cork (2019-2021)

SeaFest is Ireland's largest free maritime festival. It is fun, free and for all ages and now moved to Cork until 2021. And how could it not be, UCC was present in another edition disseminating COCKLES project.



### Cockles' Rice by Paula Chainho, FCUL

#### Ingredients

- 500gr fresh cockles (i.e. alive)
- 1 finely chopped onion
- 2 finely chopped cloves of garlic
- 2 bay leaves
- 2 cups of "carolino" rice
- 1 large bunch of coriander finely chopped
- 1 pinch of olive oil

Wash the cockles thoroughly in cold water by rubbing the shells against each other and changing the water regularly to remove dirt and sand from the outside of the shells.

Heat the cockles in a large pot and shake it occasionally until all shells are open. Remove the cockles from the pot and strain the cooking liquid. Make sure you discard any sand that might accumulate at the bottom of the pot.

Remove the meat out of most of the cockle shells, (leave some unshelled) and keep.

In another large pot heat up the olive oil and add the finely chopped onion, garlic and the bay leaves. Cook at medium heat until translucent then add the garlic the cockle cooking liquid to the onion together with 3 cups of water plus a little salt (the cockles are already salty so best to season towards the end). Once boiling add the rice and cook at medium heat, stirring occasionally. Add more water if necessary.

When the rice is cooked (roughly 15 minutes) add both shelled and unshelled cockles, stir, taste and add the chopped coriander and serve immediately.

FULL PARTNERS



ASSOCIATED PARTNERS

